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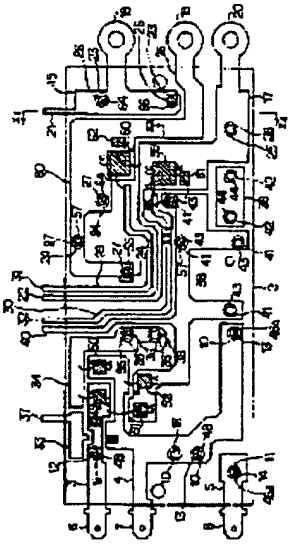
(54) COMPONENT-MOUNTING SUBSTRAE AND MANUFACTURE OF THE SAME



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a component-mounting substrate which is compact and highly reliable.

SOLUTION: A circuit pattern 80, composed of a plurality of conductive plates are embedded in a packaging part 2, and the circuit pattern 80 is provided with inner electric components such as an IGBT 59 and other, and outer electronic components such as a resonant capacitor and others. The inner electric components are wire-bonded to the circuit pattern 80 and are embedded in the packaging part 2. The outer electric components are soldered to the circuit pattern 80 through the opening 23, etc., of the

packaging part 2 from the outside. In this case, since a conductive plate, that is smaller in width than that of copper foil can be used, the circuit pattern 80 is made compact. Moreover, a connecting part with respect to the circuit pattern 80 of the inner electrical component is covered, and a connecting part with the circuit pattern 80 of the outer electric components is housed in the opening 23, etc., so that reliability of the substrate is enhanced.

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* NOTICES *

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The component-mounting substrate characterized by having the closure section made of the resin which closes the circuit pattern which consists of two or more electric conduction plates, the internal electrical part electrically connected to said circuit pattern, and said circuit pattern and said internal electrical part, and opening for being prepared in said closure section and connecting an external electrical part to said circuit pattern from the exterior of said closure section.
[Claim 2] The manufacture approach of the component-mounting substrate characterized by forming the closure section which connects an internal electrical part to the circuit pattern which consists of two or more electric conduction plates electrically, and closes said circuit pattern and said internal electrical part, and has opening, and connecting an external electrical part to said circuit pattern electrically through said opening from the exterior of said closure section.
[Claim 3] The closure section is a component-mounting substrate according to claim 1 characterized by forming epoxy system resin in an ingredient.
[Claim 4] The component-mounting substrate according to claim 1 characterized by preparing the heavy-gage part more nearly heavy-gage than the remaining part in the part corresponding to an internal electrical part among circuit patterns.
[Claim 5] The component-mounting substrate according to claim 1 characterized by preparing the outcrop exposed to the exterior of the closure section in the part corresponding to an internal electrical part among circuit patterns.
[Claim 6] The component-mounting substrate according to claim 1 which the metal member which was located in the part corresponding to an internal electrical part, and was electrically insulated with the circuit pattern is laid under the closure circles, and is characterized by preparing the outcrop exposed to the exterior of said closure section in said metal member.
[Claim 7] The component-mounting substrate according to claim 1 characterized by being located in the part corresponding to an internal electrical part, and laying the metal member of another object under the closure circles mechanically [a circuit pattern].
[Claim 8] The component-mounting substrate according to claim 1 characterized by forming the supporter which supports an external electrical part in the closure section.
[Claim 9] The component-mounting substrate according to claim 1 characterized by preparing the terminal area which projects in the exterior of the closure section in the circuit pattern.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the component-mounting substrate with which an electrical part is mounted.
[0002]
[Problem(s) to be Solved by the Invention] For example, there is a thing of a configuration of having soldered the IGBT module, the capacitor, etc. to the circuit pattern of a printed-circuit board in the component-mounting substrate which drives the magnetron of a microwave oven. Since a high current flows to a circuit pattern in this configuration, it is necessary to make broad the copper foil which constitutes a circuit pattern, and a circuit pattern becomes large. And since many soldering parts into which a high current flows are exposed on the surface of a printed-circuit board, the room of an improvement is left behind at the point of dependability.
[0003] This invention is made in view of the above-mentioned situation, and the object is small and is to offer the manufacture approach of a reliable component-mounting substrate and a component-mounting substrate.
[0004]
[Means for Solving the Problem] A component-mounting substrate according to claim 1 has the description at the place equipped with the closure section made of the resin which closes the circuit pattern which consists of two or more electric conduction plates, the internal electrical part electrically connected to said circuit pattern, and said circuit pattern and said internal electrical part, and opening for being prepared in said closure section and connecting an external electrical part to said circuit pattern from the exterior of said closure section. According to the above-mentioned means, since a narrow electric conduction plate can be used compared with copper foil, a circuit pattern is miniaturized. Moreover, since the internal electrical part is closed with the circuit pattern, a part for both connection is covered. And since an external electrical part and a circuit pattern are connectable within opening of the closure section, it is lost that the amount of [of both] connection projects in the exterior of the closure section, and dependability increases generally.
[0005] The manufacture approach of a component-mounting substrate according to claim 2 forms the closure section which connects an internal electrical part to the circuit pattern which consists of two or more electric conduction plates electrically, and closes said circuit pattern and said internal electrical part, and has opening, and has the description at the place which connects

an external electrical part to said circuit pattern electrically through said opening from the exterior of said closure section. According to the above-mentioned means, since a narrow electric conduction plate can be used compared with copper foil, a circuit pattern is miniaturized. Moreover, since the internal electrical part is closed with the circuit pattern, a part for both connection is covered. And since an external electrical part and a circuit pattern are connectable within opening of the closure section, it is lost that the amount of [of both] connection projects in the exterior of the closure section, and dependability increases generally.

[0006] A component-mounting substrate according to claim 3 has the description at the place where the closure section is formed in the ingredient in epoxy system resin. According to the above-mentioned means, the insulation of the closure section, thermal resistance, and a moldability increase.

[0007] A component-mounting substrate according to claim 4 has the description at the place where the heavy-gage part more nearly heavy-gage than the remaining part is prepared in the part corresponding to an internal electrical part among circuit patterns. According to the above-mentioned means, the thinning of the part corresponding to a heavy-gage part is carried out among the closure sections. For this reason, since heat dissipation resistance becomes small by part for the thin-walled part of the closure section, the heat dissipation nature of an internal electrical part increases.

[0008] A component-mounting substrate according to claim 5 has the description at the place in which the outcrop exposed to the part corresponding to an internal electrical part to the exterior of the closure section among circuit patterns is prepared. Since the heat generated with an internal electrical part is directly emitted outside through the outcrop of a circuit pattern according to the above-mentioned means, the heat dissipation nature of an internal electrical part increases.

[0009] The metal member electrically insulated with the circuit pattern is laid under the part corresponding to an internal electrical part among closure circles, and a component-mounting substrate according to claim 6 has the description at the place in which the outcrop exposed to said metal member to the exterior of said closure section is prepared. Since the heat generated with an internal electrical part is efficiently emitted to the exterior of the closure section according to the above-mentioned means, heat dissipation nature increases. And since a conductive heat sink can be attached in the closure section through an insulating material, components mark are reduced.

[0010] A component-mounting substrate according to claim 7 has the description at the place where the metal member of another object is laid under the part corresponding to an internal electrical part mechanically [a circuit pattern] among closure circles. According to the above-mentioned means, the thinning of the part corresponding to a metal member is carried out among the closure sections. For this reason, since heat dissipation resistance becomes small by part for the thin-walled part of the closure section, the heat dissipation nature of an internal electrical part increases.

[0011] A component-mounting substrate according to claim 8 has the description at the place where the supporter which supports an external electrical part is formed in the closure section. Since according to the above-mentioned means it is connectable with a circuit pattern where an external electrical part is supported, the connection workability of an external electrical part increases.

[0012] A component-mounting substrate according to claim 9 has the description at the place in which the terminal area which projects in the exterior of the closure section to a circuit pattern is

prepared. According to the above-mentioned means, a circuit pattern is easily connectable with a power source etc. through a terminal area.
[0013]
[Embodiment of the Invention] Hereafter, the 1st example of this invention is explained based on drawing 1 thru/or drawing 5 . The component-mounting substrate 1 of drawing 2 is arranged in the cabinet (not shown) of a microwave oven, and is constituted as follows.
[0014] The closure section 2 is formed in an ingredient in epoxy system resin, and is making oblong rectangle tabular. The input frames 3-5 which are equivalent to an electric conduction plate as shown in drawing 1 are laid under the left flank in this closure section 2, and the tab terminals 6-8 are really formed in the input frames 3-5. Each [these] tab terminals 6-8 are equivalent to a terminal area, penetrate the left lateral of the closure section 2, and project outside.
[0015] One opening 9 is formed in the closure section 2 corresponding to the input frame 3, three openings 10 are formed corresponding to the input frame 4, and one opening 11 is formed corresponding to the input frame 5. A terminal hole 12 is formed and it is located in three openings 10 at the input frame 4, and three terminal holes 13 are formed according to an individual, it is located [each / these / openings 9-11 make the shape of a round shape hole which penetrates the closure section 2 in the thickness direction, and it is located in opening 9 at the input frame 3, and] in opening 11 at the input frame 5, and the terminal hole 14 is formed.
[0016] The output frames 15-17 equivalent to an electric conduction plate are laid under the right flank in the closure section 2, and the glasses terminals 18-20 are really formed in the output frames 15-17. Each [these] glasses terminals 18-20 are equivalent to a terminal area, penetrate the right lateral of the closure section 2, and project outside. Moreover, the narrow substrate terminals 21 and 22 are really formed in the output frames 15 and 17. Each [these] substrate terminals 21 and 22 are equivalent to a terminal area, penetrate the upper bed side of the closure section 2, and project outside.
[0017] Two openings 23 are formed in the closure section 2 corresponding to the output frame 15, three openings 24 are formed corresponding to the output frame 16, and one opening 25 is formed corresponding to the output frame 17. Two terminal holes 26 are formed according to an individual, and it is located in three openings 24 at the output frame 16, and three terminal holes 27 are formed according to an individual, it is located [each / these / openings 23-25 make the shape of a round shape hole which penetrates the closure section 2 in the thickness direction, and it is located in two openings 23 at the output frame 15, and] in opening 25 at the output frame 17, and the terminal hole 28 is formed.
[0018] The narrow control frames 29 and 30 equivalent to an electric conduction plate are laid under the longitudinal-direction center section in the closure section 2, and the substrate terminals 31 and 32 are really formed in control frames 29 and 30. Each [these] substrate terminals 31 and 32 are equivalent to a terminal area, penetrate the upper bed side of the closure section 2, and project outside.
[0019] The junction frames 33 and 34 equivalent to an electric conduction plate are laid under the left flank in the closure section 2, and two openings 35 are formed in the closure section 2 corresponding to the junction frame 34. Each [these] opening 35 makes the shape of a round shape hole which penetrates the closure section 2 in the thickness direction, it is located in two openings 35 at the junction frame 34, two terminal holes 36 are formed according to an individual, and the substrate terminal 37 is really formed in the junction frame 33. This substrate

terminal 37 is equivalent to a terminal area, penetrates the upper bed side of the closure section 2, and projects outside.
[0020] In the closure section 2, the junction frames 38 and 39 equivalent to an electric conduction plate are laid underground, and the substrate terminal 40 is really formed in the long picture junction frame 38. This substrate terminal 40 is equivalent to a terminal area, penetrates the upper bed side of the closure section 2, and projects outside.
[0021] Four openings 41 are formed in the closure section 2 corresponding to the junction frame 38, and two openings 42 are formed corresponding to the junction frame 39. Each [these] openings 41 and 42 make the shape of a round shape hole which penetrates the closure section 2 in the thickness direction, and it is located in four openings 41 at the junction frame 38, and four terminal holes 43 are formed according to an individual, it is located in two openings 42 at the junction frame 39, and two terminal holes 44 are formed according to the individual.
[0022] In addition, the input frames 3-5, the output frames 15-17, control frames 29 and 30, the junction frames 33 and 34, and the junction frames 38 and 39 are formed based on carrying out press forming of the metal plate which has conductivity. Moreover, the sign 80 of drawing 1 shows the circuit pattern which consisted of the input frames 3-5, the output frames 15-17, control frames 29 and 30, junction frames 33 and 34, and junction frames 38 and 39.
[0023] Fitting of the connector (not shown) is mechanically carried out to the tab terminal 6 of the input frame 3, and the tab terminal 8 of the input frame 5. Each [these] connector builds in a pair of tab terminal (not shown), and the tab terminal 6 of the input frame 3 and the tab terminal 8 of the input frame 5 are electrically connected to the commercial alternating current power source 45 through a pair of tab terminal, as shown in drawing 5 .
[0024] Between the input frame 4 and 5, the thermal fuse 46 equivalent to an external electrical part intervenes. As this thermal fuse 46 is shown in drawing 1 , one lead terminal 46a is inserted into the terminal hole 13 of the input frame 4 through the opening 10 of the closure section 2. Lead terminal 46a of another side is inserted into the terminal hole 14 of the input frame 5 through the opening 11 of the closure section 2, and is electrically connected between the input frame 4 and 5 based on soldering both lead terminal 46a to the periphery section of terminal holes 13 and 14.
[0025] Between the input frame 3 and 4, as shown in drawing 5 , the noise prevention capacitor 47 equivalent to an external electrical part intervenes. As this noise prevention capacitor 47 is shown in drawing 1 , one lead terminal 48 is inserted into the terminal hole 12 of the input frame 3 through the opening 9 of the closure section 2. The lead terminal 48 of another side is inserted into the terminal hole 13 of the lower left corner of the input frame 4 through the opening 10 of the closure section 2, and is electrically connected between the power-source frame 3 and 4 based on soldering both the lead terminals 48 to the periphery section of terminal holes 12 and 13.
[0026] The chip diodes 49 and 50 are carried in the right flank of the power-source frames 3 and 4, and the chip diodes 49 and 50 are laid underground in the closure section 2. These chip diodes 49 and 50 are equivalent to an internal electrical part, the anode terminal A of the chip diode 49 is electrically connected based on wirebonding being carried out to the input frame 3, and the cathode terminal K is electrically connected to the junction frame 34 based on wirebonding being carried out. Moreover, the anode terminal A of the chip diode 50 is electrically connected to the input frame 4 based on wirebonding being carried out, and the cathode terminal K is electrically connected to the junction frame 34 based on wirebonding being carried out.

[0027] The chip diodes 51 and 52 are carried in the left flank of the junction frame 38, and the chip diodes 51 and 52 are laid underground in the closure section 2. These chip diodes 51 and 52 are equivalent to an internal electrical part, and the anode terminal A of the chip diodes 51 and 52 is electrically connected to the junction frame 38 based on wirebonding being carried out. Moreover, the cathode terminal K of the chip diode 51 is electrically connected to the input frame 3 based on wirebonding being carried out, and the cathode terminal K of the chip diode 52 is electrically connected to the input frame 4 based on wirebonding being carried out. In addition, the sign 53 of drawing 5 shows the rectifier circuit which consisted of chip diodes 49-52.

[0028] Between the junction frame 34 and the output frame 16, as shown in drawing 5 , the CHIIKU coil 54 equivalent to an external electrical part intervenes. As this choke coil 54 is shown in drawing 1 , one lead terminal 55 is inserted into the terminal hole 36 of the junction frame 34 through the opening 35 of the closure section 2. The lead terminal 55 of another side is inserted into the terminal hole 27 of the output frame 16 through the opening 24 of the closure section 2. Based on soldering both the lead terminals 55 to the periphery section of terminal holes 36 and 27, it connects electrically between the junction frame 34 and the output frame 16.

[0029] Between the output frame 16 and the junction frame 38, as shown in drawing 5 , the smoothing capacitor 56 equivalent to an external electrical part intervenes. As this smoothing capacitor 56 is shown in drawing 1 , one lead terminal 57 is inserted into the terminal hole 27 of the output frame 16 through the opening 24 of the closure section 2. The lead terminal 57 of another side is inserted into the terminal hole 43 of the junction frame 38 through the opening 41 of the closure section 2. Based on soldering both the lead terminals 57 to the periphery section of terminal holes 27 and 43, it connects electrically between the output frame 16 and the junction frame 38.

[0030] As shown in drawing 3 , compared with the remaining part of the output frame 17, the heavy-gage heavy-gage part 58 is formed in the output frame 17. This heavy-gage part 58 is formed based on connecting metal member 58b to the output frame 17 mechanically, and outcrop 58a exposed outside through the underside of the closure section 2 is prepared in the heavy-gage part 58. In addition, metal member 58b is formed in an ingredient in copper or alm NIUMU, and is soldered or welded to the output frame 17.

[0031] It is located in the output frame 17 at a heavy-gage part 58, IGBT59 is carried, and IGBT59 is laid underground in the closure section 2. Based on connecting electrically based on connecting electrically based on wirebonding being carried out to the output frame 17, as this IGBT59 is equivalent to an internal electrical part and the collector terminal C of IGBT59 is shown in drawing 1 , and wirebonding of the emitter terminal E being carried out to the junction frame 38, and wirebonding of the gate terminal G being carried out to a control frame 30, it connects electrically.

[0032] IGBT60 is carried in the output frame 16, and IGBT60 is laid underground in the closure section 2. Based on connecting electrically based on connecting electrically based on this IGBT60 being equivalent to an internal electrical part, and wirebonding of the collector terminal C of IGBT60 being carried out to the output frame 16, and wirebonding of the emitter terminal E being carried out to the downward output frame 17, and wirebonding of the gate terminal G being carried out to a control frame 29, it connects electrically.

[0033] In addition, the heavy-gage part 58 mentioned above is formed in the output frame 16, and IGBT60 is carried on the heavy-gage part 58 of the output frame 16. Moreover, IGBT 59 and 60 consists of a semi-conductor bare chip.

[0034] It is located in the output frame 17 under IGBT59, the chip diode 61 is carried, and the chip diode 61 is laid underground in the closure section 2. This chip diode 61 is equivalent to an internal electrical part, and the ends child of the chip diode 61 is connected to reverse juxtaposition between the collector terminal C of IGBT59, and the emitter terminal E based on wirebonding being carried out (refer to drawing 5).
[0035] It is located in the right-hand side of IGBT60 at the output frame 16, the chip diode 62 is carried, and the chip diode 62 is laid underground in the closure section 2. This chip diode 62 is equivalent to an internal electrical part, and the ends child of the chip diode 62 is connected to reverse juxtaposition between the collector terminal C of IGBT60, and the emitter terminal E based on wirebonding being carried out (refer to drawing 5).
[0036] Between the output frame 15 and 16, as shown in drawing 5 , the resonant capacitor 63 equivalent to an external electrical part intervenes. As this resonant capacitor 63 is shown in drawing 1 R> 1, one lead terminal 64 is inserted into the terminal hole 26 of the output frame 15 through the opening 23 of the closure section 2. The lead terminal 64 of another side is inserted into the terminal hole 27 of the output frame 16 through the opening 24 of the closure section 2, and is electrically connected between the output frame 15 and 16 based on soldering both the lead terminals 64 to the periphery section of terminal holes 26 and 27.
[0037] Between the output frame 15 and the junction frame 38, as shown in drawing 5 , the resonant capacitor 65 equivalent to an external electrical part intervenes. As this resonant capacitor 65 is shown in drawing 1 , one lead terminal 66 is inserted into the terminal hole 26 of the output frame 15 through the opening 23 of the closure section 2. The lead terminal 66 of another side is inserted into the terminal hole 43 of the junction frame 38 through the opening 41 of the closure section 2. Based on soldering both the lead terminals 66 to the periphery section of terminal holes 26 and 43, it connects electrically between the output frame 15 and the junction frame 38.
[0038] As shown in drawing 4 , it is located in the both ends of a smoothing capacitor 56, the both ends of a resonant capacitor 63, and the both ends of a resonant capacitor 65, and the plate-like rib 67 is really formed in the closure section 2 (the rib 67 of both ends is illustrated about a smoothing capacitor 56, and only the rib 67 of the end section is illustrated about resonant capacitors 63 and 65). Each [these] rib 67 has the bow side 68 of the shape of radii along the front face of smoothing capacitor 56 grade, and has prevented **** of smoothing capacitor 56 grade based on supporting smoothing capacitor 56 grade. In addition, a rib 67 is equivalent to a supporter and is really formed also in the part corresponding to the both ends of the noise prevention capacitor 47 among the closure sections 2.
[0039] The heat sink 70 is being fixed to the underside of the closure section 2 through the plate-like insulating material 69, and as the output frames 16 and 17 are shown in drawing 3 , outcrop 58a of a heavy-gage part 58 has stuck to the insulating material 69 (only the heavy-gage part 58 of the output frame 17 is illustrated). This heat sink 70 has two or more radiation fins 71, as it is formed in an ingredient and metals, such as aluminum, are shown in drawing 4 . The component-mounting substrate 1 is constituted as mentioned above.
[0040] The stop of the control board 72 is ****ed and carried out to the heat sink 70. This control board 72 consists of a printed-circuit board, the substrate terminal 21 of the output frame 15, the substrate terminal 22 of the output frame 17, the substrate terminal 31 of a control frame 29, the substrate terminal 32 of a control frame 30, the substrate terminal 37 of the junction frame 33, and the substrate terminal 40 of the junction frame 38 are inserted in a control board

72, and it connects electrically based on being soldered to the circuit pattern of a control board 72.
[0041] As shown in drawing 5 , the control unit 73 is carried in the control board 72. This control unit 73 is constituted by the subject in a microcomputer, and it connects electrically based on being soldered to the circuit pattern of a control board 72. This control unit 73 is electrically connected to gate terminal G of IGBT 60 and 59 through control frames 29 and 30, and switching control of IGBT 60 and 59 is carried out based on outputting a drive signal to gate terminal G of IGBT 60 and 59.
[0042] The pressure-up transformer 74 of drawing 5 has a primary coil 75, a secondary coil 76, and the heater coil 77, and the glasses terminal (not shown) is electrically connected to the both ends of a primary coil 75. Both [these] the glasses terminal is ****ed for the glasses terminal 18 of the output frame 15, and the glasses terminal 20 of the output frame 17, the stop is carried out and the output frames 15 and 17 are electrically connected to the primary coil 75 through the glasses terminals 18 and 20.
[0043] The ends child of the heater coil 77 is electrically connected to both the cathode terminals of a magnetron 78. Moreover, the ends child of a secondary coil 76 is electrically connected to both the input terminals of a voltage doubler rectifier circuit 79, one output terminal of a voltage doubler rectifier circuit 79 is electrically connected to the anode terminal of a magnetron 78, and the output terminal of another side is electrically connected to one cathode terminal of a magnetron 78.
[0044] Next, the manufacture approach of the component-mounting substrate 1 is explained. The chip diodes 49 and 50 are carried in the input frames 3 and 4, wirebonding is carried out, and wirebonding of the chip diodes 51 and 52 is carried and carried out to the junction frame 38. With this, IGBT59 and the chip diode 61 are carried in the output frame 17, wirebonding is carried out, and wirebonding of IGBT60 and the chip diode 62 is carried and carried out to the output frame 16.
[0045] If wirebonding of the chip diodes 49-52, IGBT 59 and 60, and the chip diodes 61 and 62 is carried out, the input frames 3-5, the output frames 15-17, control frames 29 and 30, the junction frames 33 and 34, and the junction frames 38 and 39 will be contained in a die (not shown). After fabricating the closure section 2 in this condition based on carrying out potting of the epoxy system resin in a die, a thermal fuse 46, the noise prevention capacitor 47, a choke coil 53, a smoothing capacitor 55, and resonant capacitors 63 and 65 are soldered.
[0046] According to the 1st example of the above, the circuit pattern 80 consisted of electric conduction plates of the input frame 3 - 5 grades. For this reason, since a narrow electric conduction plate can be used compared with copper foil, a circuit pattern is miniaturized. Moreover, since the internal electrical part (active element) of IGBT59 grade was closed by the closure section 2, a part for the connection to the circuit pattern 80 of an internal electrical part is closed by the closure section 2. And since the external electrical part (passive element) of resonant capacitor 63 grade was connected inside the opening 23 grade, it is lost that the amount of [to the circuit pattern 80 of an external electrical part] connection projects in the exterior of the closure section 2, and dependability increases generally. Moreover, since epoxy system resin was formed in the ingredient for the closure section 2, the insulation of the closure section 2, thermal resistance, and a moldability increase.
[0047] Moreover, the heavy-gage part 58 was formed in the loading part of IGBT 59 and 60 among the circuit patterns 80. For this reason, since the thinning of the part corresponding to a heavy-gage part 58 is carried out among the closure sections 2, heat dissipation resistance

becomes small by part for the thin-walled part of the closure section 2. Therefore, since the heat dissipation nature of IGBT 59 and 60 increases, a heat sink 70 is miniaturized. In this case, since heavy-gage part 58a was formed based on connecting metal plate 58b of another object to the circuit pattern 80 mechanically, compared with the case where the thickness of the circuit pattern 80 is changed based on carrying out press forming of the electric conduction plate, for example, a heavy-gage part 58 is formed simply.

[0048] Moreover, since outcrop 58a was prepared in the loading part of IGBT 59 and 60 among the circuit patterns 80, the heat generated in IGBT 59 and 60 is directly emitted to the exterior of the closure section 2 through outcrop 58a. For this reason, since the heat dissipation nature of IGBT 59 and 60 increases further, small [of the heat sink 70] is carried out further.

[0049] Moreover, the rib 67 was formed in the closure section 2. For this reason, since it can solder to the circuit pattern 80 where the external electrical part of smoothing capacitor 56 grade is supported, the connection workability of an external electrical part increases. Moreover, since the tab terminals 6-8 were formed in the circuit pattern 80, the circuit pattern 80 is easily [the commercial alternating current power source 45] connectable with the tab terminals 6-8 only by fitting in a pair of connector.

[0050] Moreover, since the glasses terminals 18-20 were formed in the circuit pattern 80, the circuit pattern 80 is easily [the primary coil 75 of the pressure-up transformer 74] connectable only by ****ing and carrying out the stop of a pair of glasses terminal to the glasses terminals 18-20. Moreover, since the substrate terminals 21, 22, 31, 32, 37, and 40 were formed in the circuit pattern 80, the circuit pattern 80 is easily [a control board 72] connectable only by inserting and soldering a control board 72 to substrate terminal 21 grade.

[0051] In addition, in the 1st example of the above, although outcrop 58a was prepared in the underside of a heavy-gage part 58, it is not limited to this and the underside of a heavy-gage part 58 may be laid underground in the closure section 2 like drawing 6 which shows the 2nd example of this invention. In this case, since the thinning of the part corresponding to a heavy-gage part 58 is carried out among the closure sections 2, heat dissipation resistance becomes small by part for the thin-walled part of the closure section 2, and the heat dissipation nature of IGBT 59 and 60 increases. And since a heat sink 70 can be directly contacted on the underside of the closure section 2, an insulating material 69 becomes unnecessary.

[0052] moreover, the thing which it is not limited to this, and it leaves a plate, for example, is done for press forming of the heavy-gage part 58 although the heavy-gage part 58 was formed in the 1st and 2nd examples of the above based on connecting metal member 58b to the output frames 16 and 17 -- being based -- the remainder -- thin -- a **** part may be formed.

[0053] Moreover, in the 1st example of the above, although the heavy-gage part 58 was formed in the output frames 16 and 17 and outcrop 58a was prepared in the heavy-gage part 58, it is not limited to this, and like drawing 7 which shows the 3rd example of this invention, the bending section 81 may be formed in the output frames 16 and 17 (only the bending section 81 of the output frame 17 is illustrated), and an outcrop 82 may be formed in the underside of each bending section 81. In this case, since heavy-gage metal member 58b becomes unnecessary, components mark are reduced upwards and product weight becomes light.

[0054] Next, the 4th example of this invention is explained based on drawing 8 . In the closure section 2, it is located under IGBT 59 and 60, and the tabular metal member 83 is laid underground (only the metal member 83 laid underground under IGBT59 is illustrated). Closure shaping of each [these] metal member 83 is carried out with the electric conduction plate of the input frame 3 - 5 grades, and the outcrop 84 exposed to the underside of the closure section 2 is

formed in each metal member 83. Moreover, the heat sink 70 is being fixed to the underside of the closure section 2, and the outcrop 84 of each metal member 83 is stuck to the heat sink 70.
[0055] According to the 2nd example of the above, the metal member 83 of another object was laid underground mechanically [the circuit pattern 80] in the closure section 2. For this reason, since the thinning of the part corresponding to the metal member 83 is carried out among the closure sections 2, heat dissipation resistance becomes small by part for the thin-walled part of the closure section 2, and the heat dissipation nature of IGBT 59 and 60 increases.
[0056] Moreover, the metal member 83 was electrically insulated to the circuit pattern 80, and the outcrop 84 was formed in the metal member 83. For this reason, since the heat generated in IGBT 59 and 60 is efficiently emitted to the exterior of the closure section 2, heat dissipation nature increases further. And since a heat sink 70 can be attached in the closure section 2 through an insulating material 69, components mark are reduced.
[0057] In addition, cream solder is applied to input frame 2 grade through the opening 9 grade of the closure section 2, lead terminal 48 grade is forced on cream solder through opening 9 grade, and you may make it connect in the above 1st thru/or the 4th example. It becomes unnecessary in this case, to form terminal insertion hole 12 grade in input frame 2 grade.
[0058] Moreover, in the above 1st thru/or the 4th example, although the breakthrough-like opening 9 grade was formed in the closure section 2, it is not limited to this and only the whole surface in which the lead terminal of an external electrical part is inserted may form concave opening which carries out opening.
[0059] Moreover, in the above 1st thru/or the 4th example, although the input frames 3-5, the output frames 15-17, control frames 29 and 30, and the junction frames 33 and 34 were pierced from the plate, it is not limited to this (although press forming is carried out), and you may form by approaches, such as etching.
[0060] Moreover, in the above 1st thru/or the 4th example, although this invention was applied to the component-mounting substrate 1 which drives the magnetron 78 of a microwave oven, it is not limited to this and this invention may be applied to the component-mounting substrate which carries out revolution actuation of the main motor capacity of the component-mounting substrate which drives the heating coil of a high-frequency-heating machine, or a washer.
[0061]
[Effect of the Invention] The manufacture approach of the component-mounting substrate of this invention and a component-mounting substrate does the following effectiveness so so that clearly from the above explanation. According to the means claim 1 and given in two, since the circuit pattern was constituted from an electric conduction plate, a circuit pattern is miniaturized. And since an internal electrical part is closed by the closure section and the external electrical part was connected to the circuit pattern within opening of the closure section, dependability increases. According to the means according to claim 3, since epoxy system resin was formed in the ingredient for the closure section, the insulation of the closure section, thermal resistance, and a moldability increase.
[0062] According to the means according to claim 4, since the heavy-gage part was prepared in the part corresponding to an internal electrical part among circuit patterns, the heat dissipation nature of an internal electrical part increases. According to the means according to claim 5, since the outcrop was prepared in the part corresponding to an internal electrical part among circuit patterns, the heat dissipation nature of an internal electrical part increases.
[0063] Since according to the means according to claim 6 the metal member insulated to the circuit pattern is laid under the closure circles and the outcrop was prepared in the metal

member, when the heat dissipation nature of an internal electrical part increases, the insulating material with which between the closure section and a heat sink is insulated becomes unnecessary. According to the means according to claim 7, since the metal member of another object was laid under the closure circles mechanically [a circuit pattern], the heat dissipation nature of an internal electrical part increases.

[0064] Since the supporter which supports an external electrical part was formed in the closure section according to the means according to claim 8, the connection workability of an external electrical part increases. According to the means according to claim 9, since the terminal area was prepared in the circuit pattern, a circuit pattern is easily [a power source etc.] connectable.

[Translation done.]